FIG.1

PBX

PARALLEL I/F CONTROL UNIT 18

LAN CONTROL UNIT 19

TRANSMISSION CONTROL UNIT 20

OPB

PRINTER CONTROL UNIT 16

FAX CONTROL UNIT 17

OPERATION / DISPLAY UNIT

IC CARD 11

10

MAIN CONTROLLER

EDITOR 15

300

IPU

SCANNER CONTROL UNIT 12

SCANNER 200

AUTOMATIC DOCUMENT FEEDER ADF 320

SORTER CONTROL UNIT 14

SORTER STR

PRINTER ENGINE CONTROL UNIT 13

COLOR PRINTER UNIT 400

M
DRIVE MOTOR

DOCUMENT DETECTOR 320

FIG.2

FIG.3

FIG.4A

FILTER

MAIN SCANNING DIRECTION x→

a1	a2	a3	a4	a5	a6	a7
b1	b2	b3	b4	b5	b6	b7
c1	c2	c3	c4	c5	c6	c7
d1	d2	d3	d4	d5	d6	d7
e1	e2	e3	e4	e5	e6	e7

SUB SCANNING DIRECTION y

321

DOCUMENT RECOGNITION UNIT — 320

FINAL DETERMINATION UNIT — 326

326a CHARACTER DETERMINATION UNIT

326b ENLARGEMENT PROCESS UNIT

326c CHARACTER INNER SPACE DETERMINATION UNIT

326d DECODER

C/P

B/C

EDGE DETECTION UNIT — 322

322a TRINARIZATION UNIT

322b CONTINUOUS BLACK PIXEL DETECTION UNIT

322c CONTINUOUS WHITE PIXEL DETECTION UNIT

322d NEIGHBORING PIXEL DETECTION UNIT

322e ISOLATED POINT REMOVING UNIT

edge

WHITE AREA EXTRACTION UNIT — 323

323a BINARIZATION UNIT

323b RGB EXTRACTION RGB WHITE BACK GROUND DETECTION

323b' Assumed White Pixel DETECTION WHITE PIXEL VALLEY DETECTION

323c WHITE BACKGROUND DETERMINATION

323e BLACK BACKGROUND DETERMINATION

323d WHITE PATTERN MATCHING UNIT

323f BLACK PATTERN MATCHING UNIT

323g WHITE CONNECTION UNIT

wh. wfw. whbk

DOT PATTERN EXTRACTION UNIT — 324

324a FIRST DOT PATTERN PEAK DETECTION UNIT

324b SECOND DOT PATTERN PEAK DETECTION UNIT

324c CROSS POINT AREA DETECTION UNIT

324d TEMPORARY MEMORY UNIT

ht

FROM SCANNER 200 →

R
G
B

COLOR DETERMINATION — 325

325a COLOR PHASE DIVISION UNIT

325b c MEMORY UNIT 5×5

325c m MEMORY UNIT 5×5

325d y MEMORY UNIT 5×5

325e w MEMORY UNIT 5×5

325f COLOR PIXEL DETERMINATION

G
R
G
B

FIG.4B

START

MS<SS [I]? —1

NO

MS=SS [I] —2

3

WHITE
BACKGROUND —— NO

YES

COLOR
BACKGROUND —6 YES

4

MS=15

NO

BINARIZATION
WHITE? —7 NO

YES

MS≧thw1? —8 NO

YES

NO

MS≧thw2? —11

MS=15? —9

YES

NO

WHITE VALLEY
PIXEL? —12

YES

NO

MS=MS+1 —10

MS=MS-1

YES

13

J=0
SS [I]=MS —5

MS-J>SS [I-1]? —14 YES

SS [I-1]=MS-J —15

NO

J=J+1 —16

J=MS? —17 NO

YES

END

MS : STATE VARIABLE
SS : ARRAY OF STATE VARIABLES
I : PIXEL POSITION IN MAIN SCANNING DIRECTION
thws1 : FIRST THRESHOLD VALUE
thws2 : SECOND THRESHOLD VALUE

FIG.5A

START

MS<SS [I]? ──1──── NO ───→ MS=SS [I] ──2

3 WHITE BACKGROUND ── NO ───→ Assumed White Pixels ──6── No ──→

4 ↓ YES
MS=15

YES
BINARIZATION WHITE? ──7── NO ───→

MS≧thw1? ──8── NO ───→

MS≧thw2? ──11── NO ───→

YES
MS=15? ──9

WHITE VALLEY PIXEL? ──12── YES

NO
MS=MS+1 ──10   MS=MS-1 ──13

J=0
SS [I]=MS ──5

MS-J>SS [I-1]? ──14── YES ──→ SS [I-1]=MS-J ──15

NO

J=J+1 ──16

J=MS? ──17── NO

YES

END

MS : STATE VARIABLE
SS : ARRAY OF STATE VARIABLES
I : PIXEL POSITION IN MAIN SCANNING DIRECTION
thws1 : FIRST THRESHOLD VALUE
thws2 : SECOND THRESHOLD VALUE

FIG.5B

325f

COLOR PIXEL DETERMINATION

325b c
325c m
325d y
325e w

325f1 COUNTER 1
325f2 COUNTER 2
325f3 COUNTER 3
325f4 COUNTER 4
325f5 PATTERN MATCHING 1
325f6 PATTERN MATCHING 2
325f7 PATTERN MATCHING 3

325f8 COLOR PIXEL DETERMINATION 1
325f12 COLOR PIXEL DETERMINATION 2
325f15 COLOR PIXEL DETERMINATION 3
325f18 ACHROMATIC DETERMINATION (BLACK DETERMINATION)

325f9 BLOCK 1
325f13 BLOCK 2
325f16 BLOCK 3
325f19 BLOCK 4

325f10 ISOLATED POINT REMOVAL 3×3
325f14 DENSITY 1
325f17 DENSITY 2
325f20 ENLARGEMENT 3×3

325f11 ENLARGEMENT 5×5

325f21 TOTAL COLOR PIXEL DETERMINATION

325f22 ENLARGEMENT 9×9

325f23 CONTINUOUS COUNT

B/C

326 FINAL DETERMINATION

FIG.6

START

21
NO — COLOR PIXEL BLOCK?

27
SS[I]=0

YES

22
SS[I]=0? — YES

NO

23
A=SS[I+1]

24
A=SS[I+1]+1

25
B=SS[I-1]+1
C=SS[I]+1
D=MS[I]+1

26
MS[I]=MAX(A,B,C,D)

28
MS[I]≧THACS? — YES

NO

30
I=I+1

29
COLOR DOCUMENT

31
NO — MAIN SCANNING END?

YES

32
I←1

33
J=J+1

34
NO — SUB SCANNING END?

YES

END

MS : STATE VARIABLE
SS : AROW OF STATE VARIABLES
I : PIXEL POSITION IN MAIN SCANNING DIRECTION
THACS : THRESHOLD VALUE

FIG.7

FIG.8A

PATTERN AT 600dpi

FIG.8B

PATTERN AT 400dpi

BPa   BPb   BPc   BPd

WPa   WPb   WPc   WPd

FIG.9

WBP

x

y

RDPa

x

y

RDPb

BBP

x

y

FIG.10

MPp

x

y

a1	a2	a3	a4	a5
b1	b2	b3	b4	b5
c1	c2	c3	c4	c5
d1	d2	d3	d4	d5
e1	e2	e3	e4	e5

MCa

x

y

MCb

MCc

MCd

FIG.11

CURRENT
PROCESSING
LINE SS [1]

LMP

→ x

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | E |

PMPa   PMPb   PMPc   PMPd

BCP

X

FIG.12

Bp1

Bp2

Bp3

Bp4
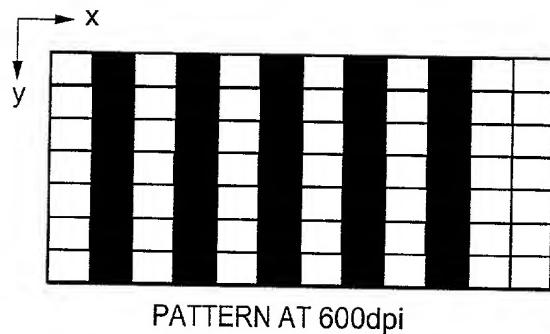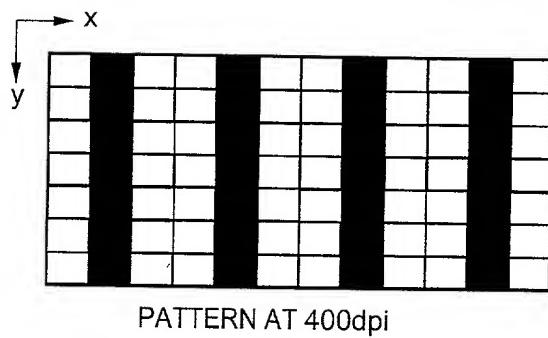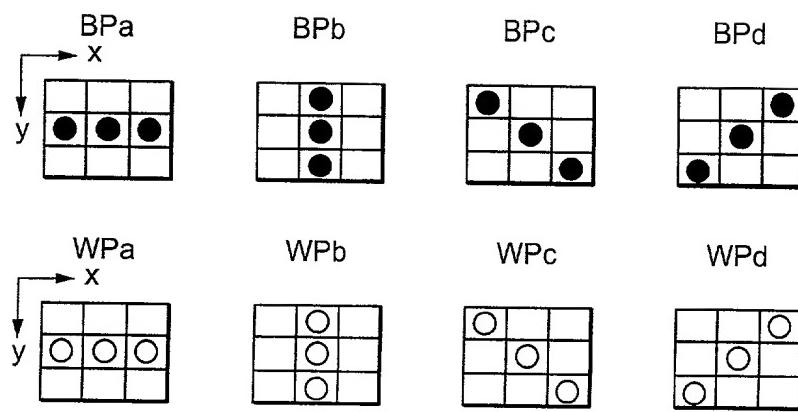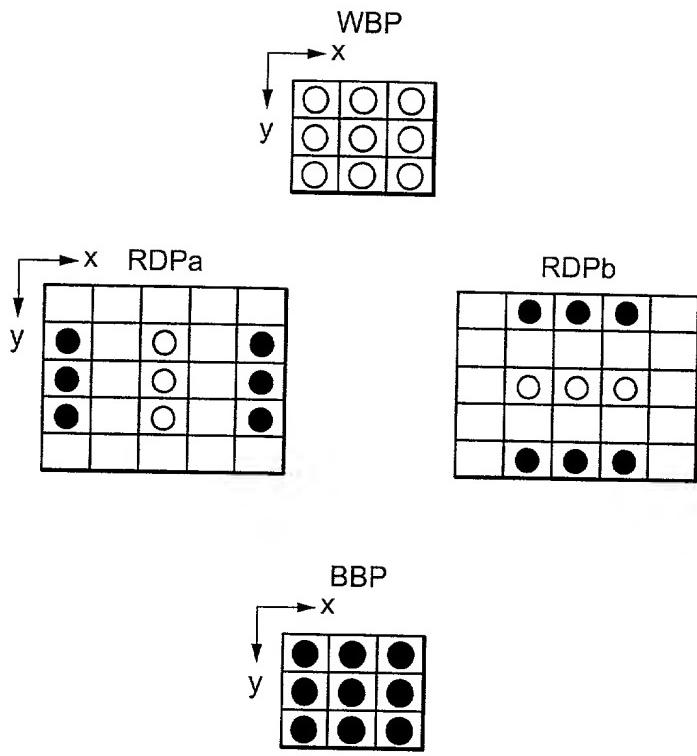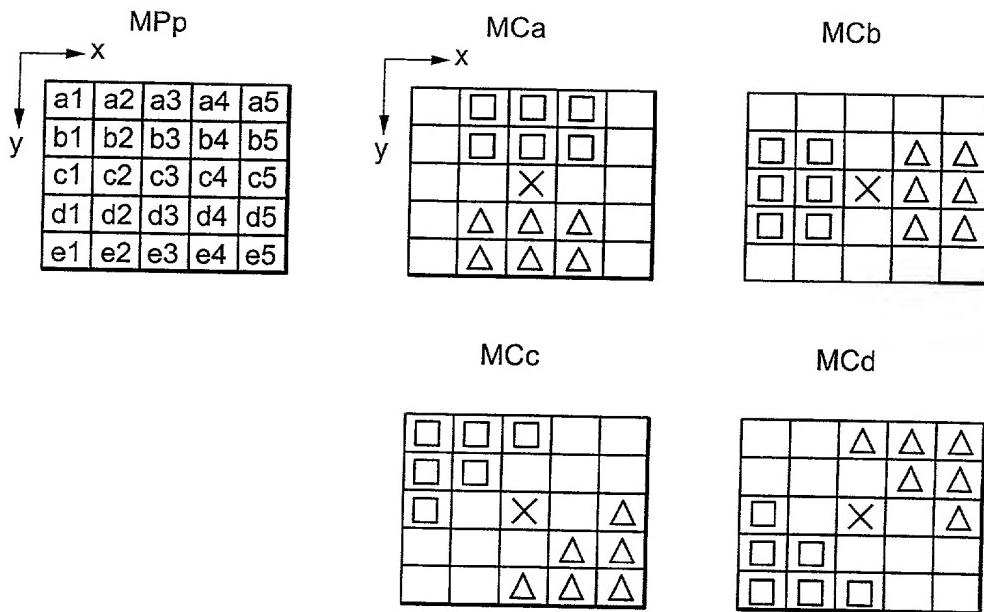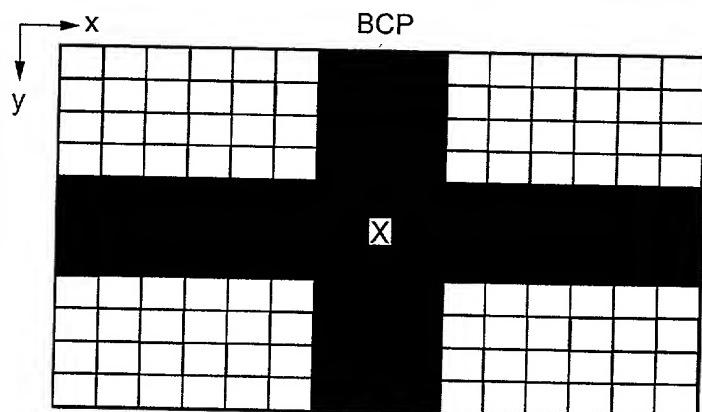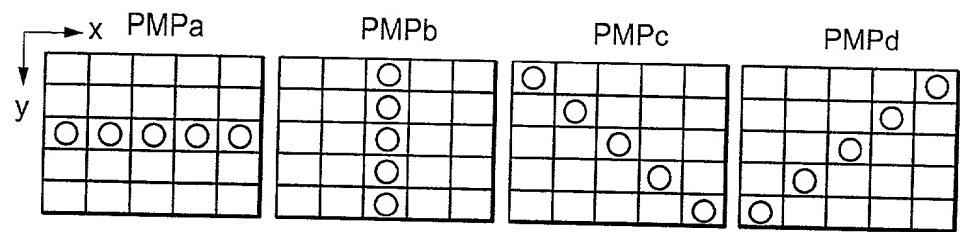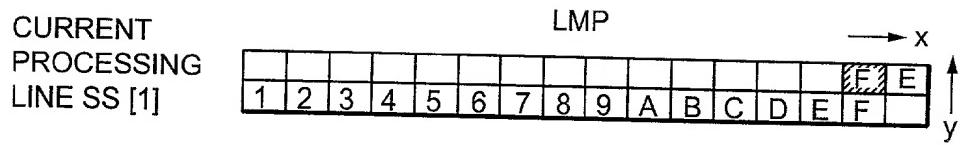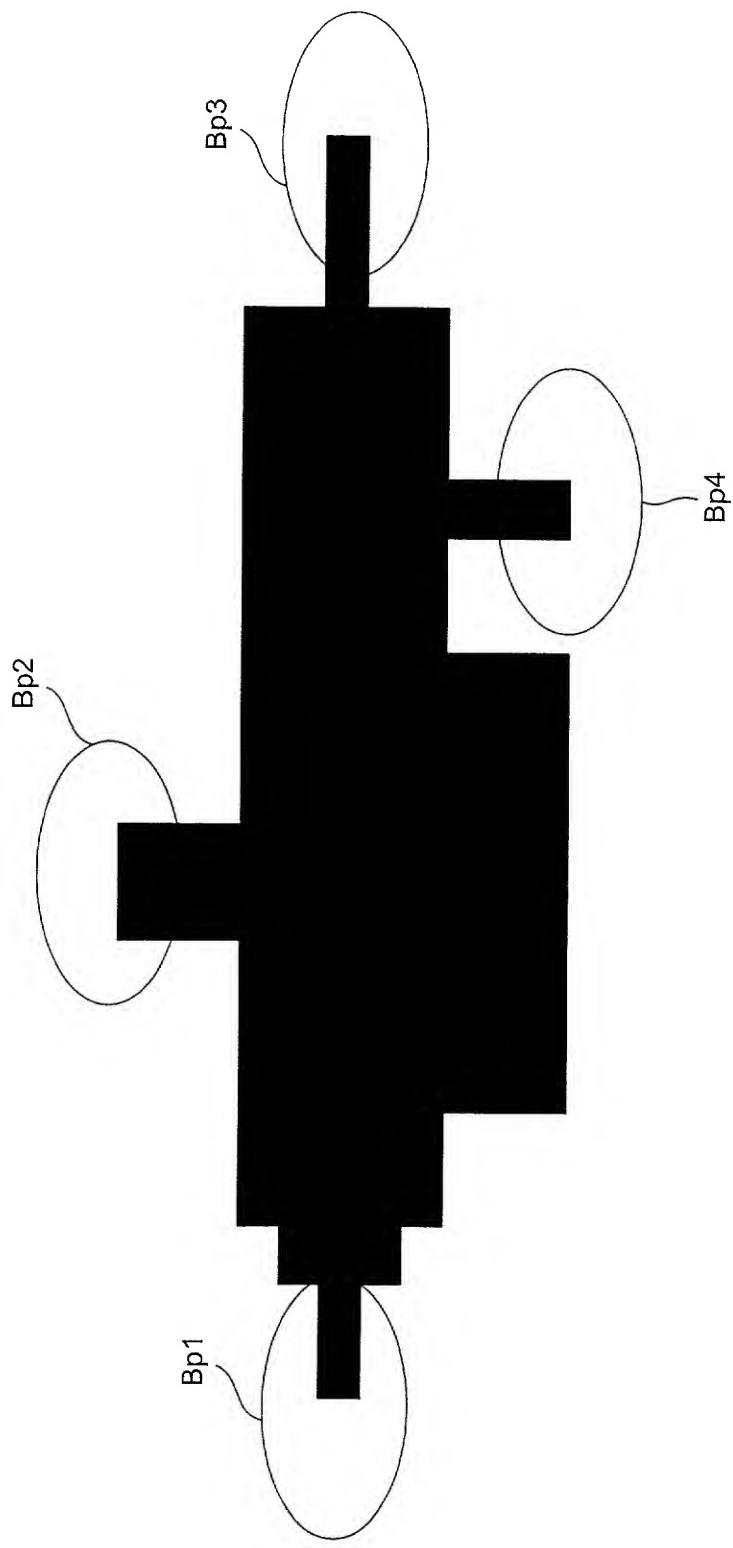
FIG.13
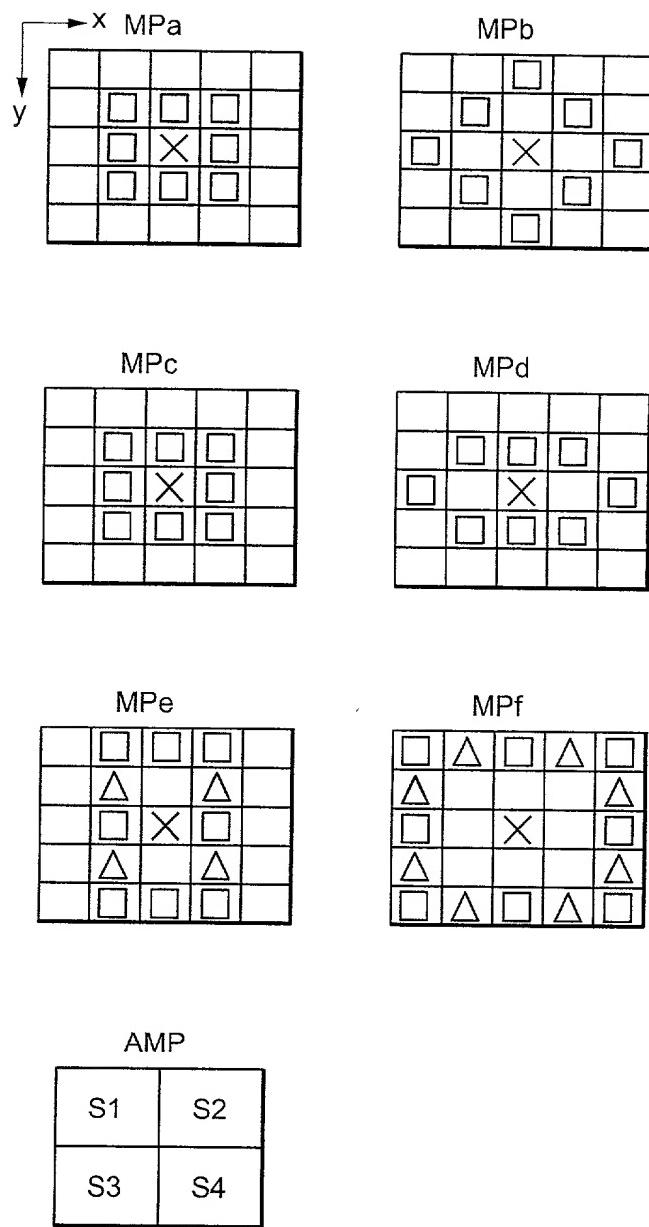
FIG.14
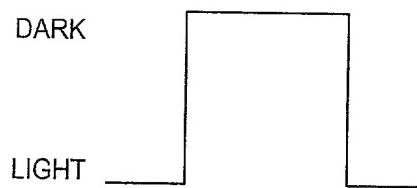
FIG.15A

FIG.15B
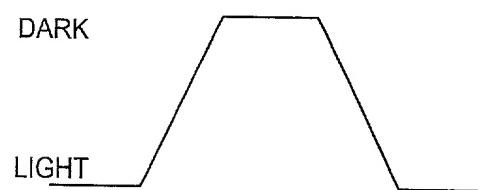
FIG.15C

FIG.16

FIG.17

FIG.18

MAIN SCANNING DIRECTION

SUB
SCANNING
DIRECTION

FIG.19

FIG.20(A)

☐ :Y COMPONENT IN BLACK IN PHOTOGRAPHIC MODE
▨ :M COMPONENT IN BLACK IN PHOTOGRAPHIC MODE
▨ :C COMPONENT IN BLACK IN PHOTOGRAPHIC MODE
▨ :BK (GRAY) COMPONENT IN BLACK IN PHOTOGRAPHIC MODE
■ :BK (BLACK) COMPONENT IN BLACK IN PHOTOGRAPHIC MODE
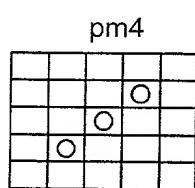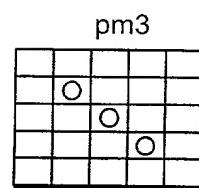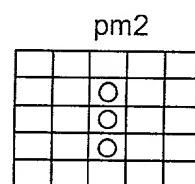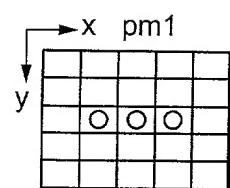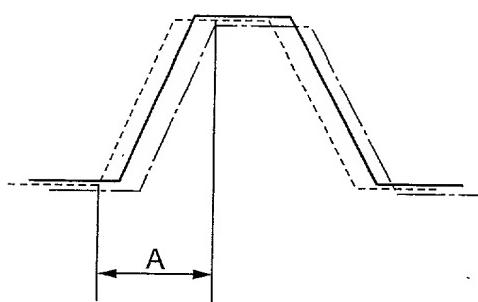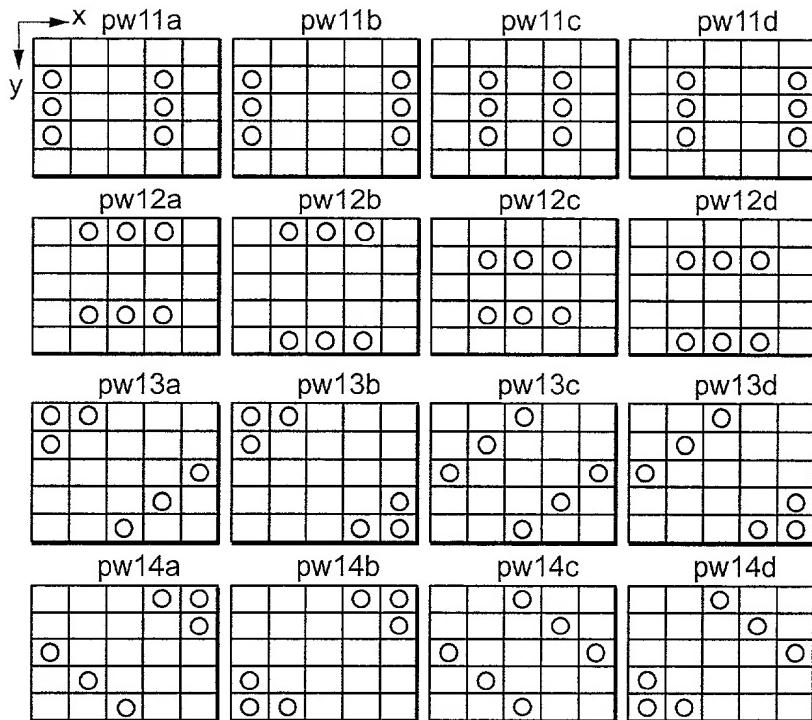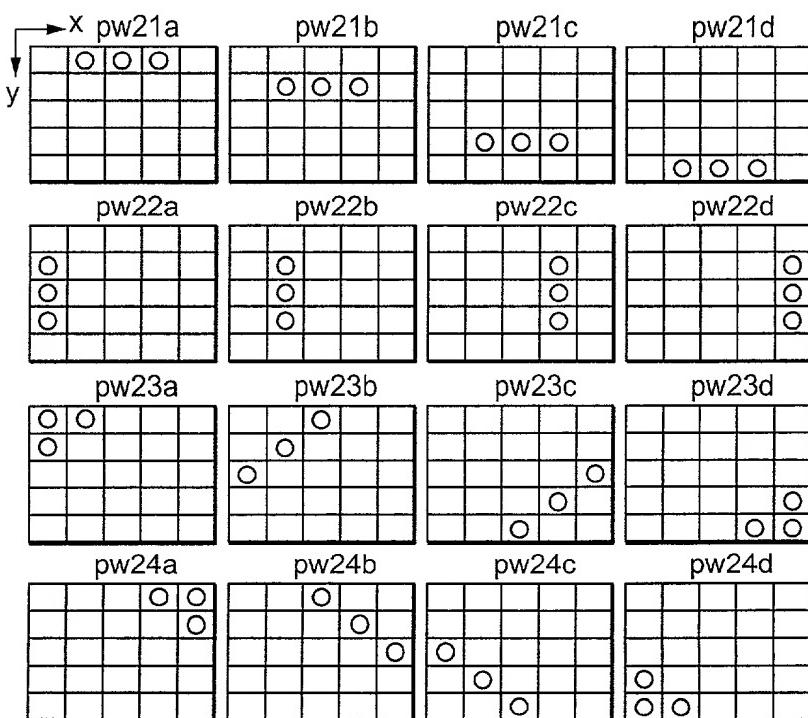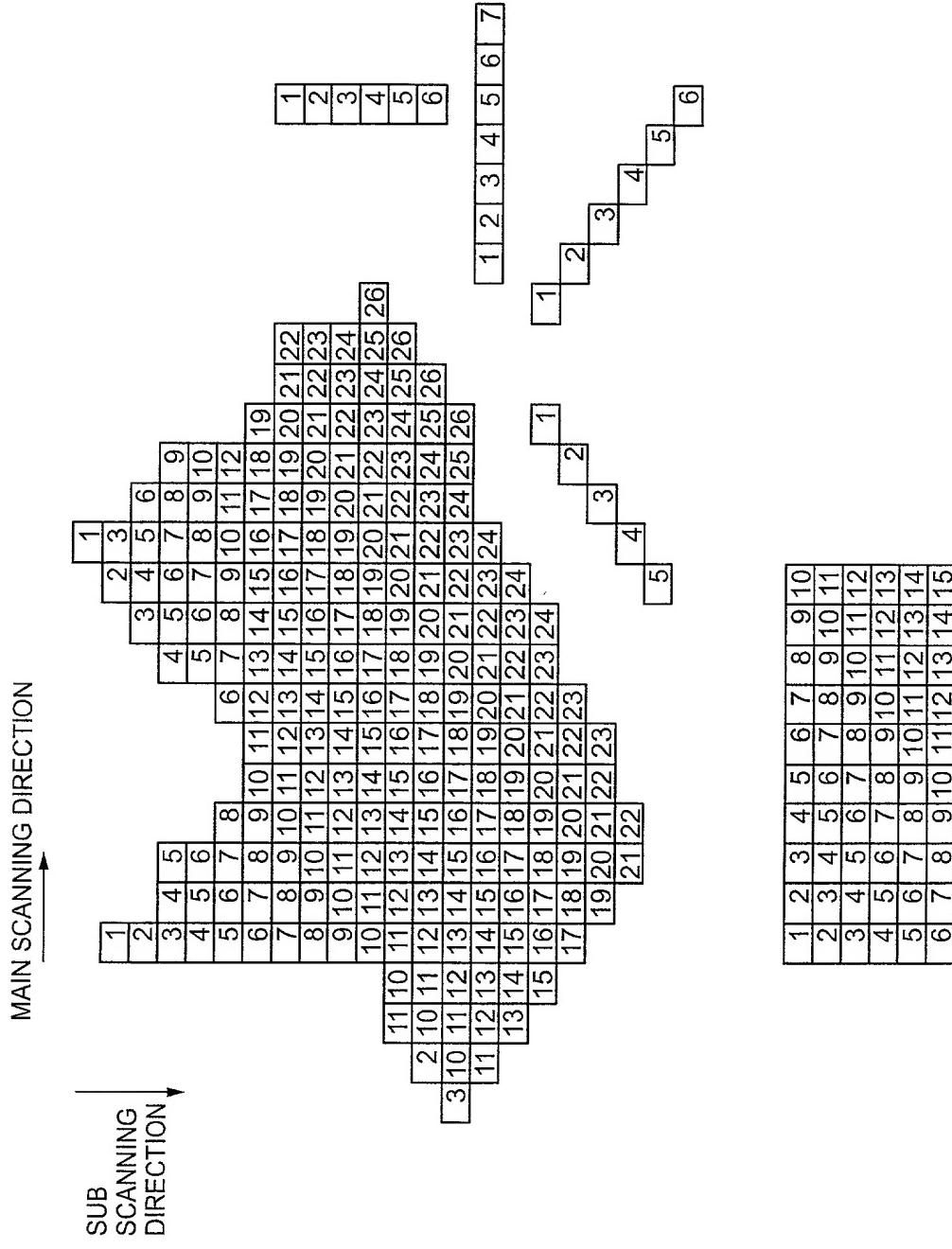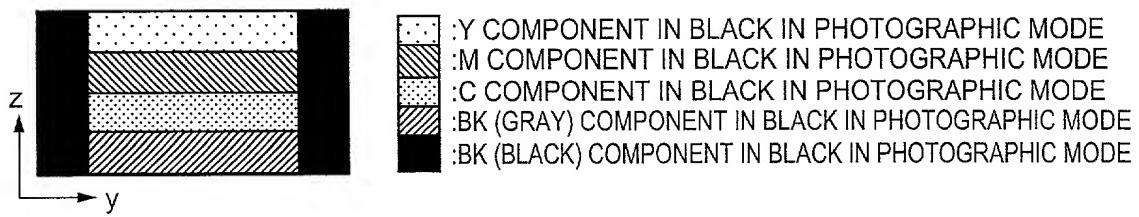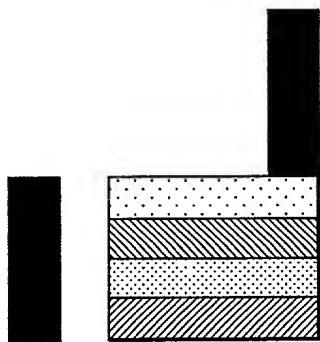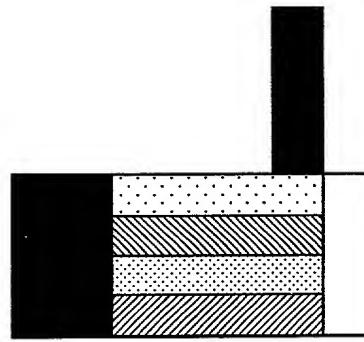
FIG.20(B)
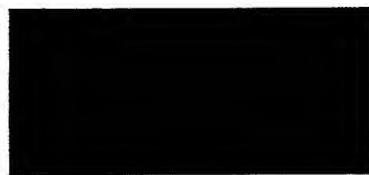
# FIG.20(C)

FIG.20(D)

FIG.20(E)
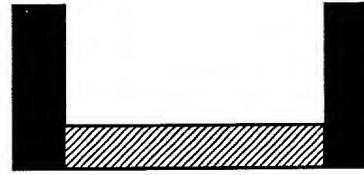
FIG.20(F)
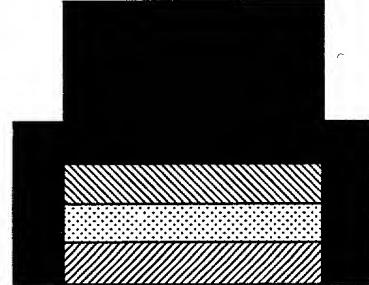
FIG.20(G)
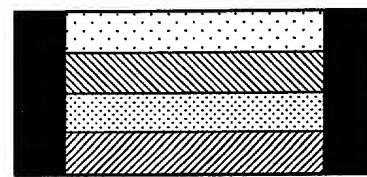
FIG.21(A)

	x1	x2	x3	x4
y1				
y2	A21	A22	A23	A24

FIG.21(B)

	x1	x2	x3	x4
y1				
y2				B24

FIG.21(C)

	x1	x2	x3	x4
y1				
y2				C24

FIG.21(D)

	x1	x2	x3	x4	
y1			Q13	Q14	Q15
y2			Q23	Q24	

CURRENT PIXEL